

# **BRACHYDINIUM, A NEW GENUS OF THE DINOCOCCALES FROM THE INDIAN OCEAN.**

By F. J. R. TAYLOR

(With Plate VIII)

(*Oceanography Department, University of Cape Town*)

During an analysis of phytoplankton material gathered from the South West Indian Ocean by the S.A.S. "Natal", unicellular organisms of an unusual nature were observed. From their structure they appeared to be vegetative stages of some species of Dinococcales, possessing an essentially Protococcalean type of organisation with homogenous cell walls, lacking plates, grooves or flagellae. However, it was not possible to assign them to any of those genera described in Schiller (1937), the most comprehensive systematic work including this group.

There have been eight genera described within this order of the Dinophyceae, arranged into four families. Of these genera *Pyrocystis* Murray and *Thaurilens* Pavillard appear to be the only ones with marine representatives, the former being common in warmer waters. All autotrophic genera belong to the family Phytodiniaceae Klebs, and the genus described in this paper would seem to belong to this family as it has well developed chromatophores.

**BRACHYDINIUM** F. J. R. Taylor gen. nov.

Cellulae nonmotae, singulae, in mare natatione, lateraliter compressae, cum cornubus cavis atque chromoplasma etiam continentibus; chromatophorae numerosae, irregularis; nucleus patens.

Single non-motile cells in the vegetative stage, planktonic in the sea. Narrow horn-like processes arise from the cell body, and the cell contents penetrate them completely. The chromatophores are numerous, irregularly-shaped bodies, found also in the processes. The nucleus is large and distinct, clearly visible without staining.

Type species: *Brachydinium capitatum* sp. nov.

When considering possible affinities of the genus it would seem that it belongs to the family Phytodiniaceae. The detailed cell structure resembles the genera *Cystodinium* Klebs and *Tetradinium* Klebs, both fresh water genera, but is notably different from them in that the cell contents including the chromatophores penetrate the processes.

***Brachydinium capitatum*** F. J. R. Taylor sp. nov.—Cellulae nonmotae, delicatulae, in mare natatione cum quattuor cornubus elongatis arcuatis ex uno plano excurrentibus, lateraliter compressae parte dorsale quasi operculum cum

duobus cavis oppositis in axillis inter eodem cornubusque dorsalibus; chromatophorae numerosae, irregularis; nucleus patens, parietalis.

*Habitat:* In mare Indica.

The vegetative cells occur singly, planktonic in oceanic waters. They are free-floating, non-motile, laterally compressed organisms possessing four elongate curved processes arising from the angles of the cell body, and in the same plane as the lateral compression. The distal portions of the processes are more or less curved away from the plane of compression when viewed either dorsally or ventrally. Between the two dorsal processes there is a distinct capitate protuberance which is sharply delimited by two indentations at the junctions with the processes. The indentations do not appear to be linked by a continuation over the surface of the cell body. The nucleus is distinct as a large granular area displaced to one side (parietal). The cell possesses a number of irregular chromatophores which are most striking in the processes where they are largest, and may swell the walls somewhat. They are a bright yellow-green in colour. The cell wall is thin and hyaline, with no plates or other structural modifications visible upon it.

For convenience in description the author has considered the surface marked by the capitate protuberance as dorsal, this being a purely arbitrary choice.

|                                                  |         |              |
|--------------------------------------------------|---------|--------------|
| Distance from tip to tip of the dorsal processes | ..      | 95—123 $\mu$ |
| Length of the cell body                          | .. .. . | 31— 46 $\mu$ |
| Depth of the cell body at the narrowest          | .. .. . | 10— 12 $\mu$ |
| Width of the cell body                           | .. .. . | 9— 10 $\mu$  |
| Length of the processes                          | .. .. . | 26— 40 $\mu$ |

*Iconotype:* Plate 1, figure 1.

Type locality: South West Indian Ocean.

Reference material: T N I-1, and -2, in the Bolus Herbarium, Cape Town.

Abundance in the material (mixed phytoplankton): Very rare.

The species is interesting in that the cells appear to exhibit a structural adaptation to their environment, namely, the production of elongate processes. This phenomenon is commonly found among phytoplankton species of many different groups, and it is thought to be a means of counteracting sinking below the upper, sunlit (euphotic) zone. In this connection it might also be noted that the specimen from the more northerly station in less dense water (see pl. 1, fig. 3) exhibited a greater elongation of processes which showed a more marked curvature than those of the more southerly specimen.

The two individuals illustrated were found at stations some distance from land, and it is possible that the species is truly planktonic (holoplanktonic).

The exact localities and station numbers where the specimens were found are as follows:

Station N I O E 30—38° 50' S, 27° 33.5' E.

N I O E 71—33° 21' S, 30° 30.0' E.

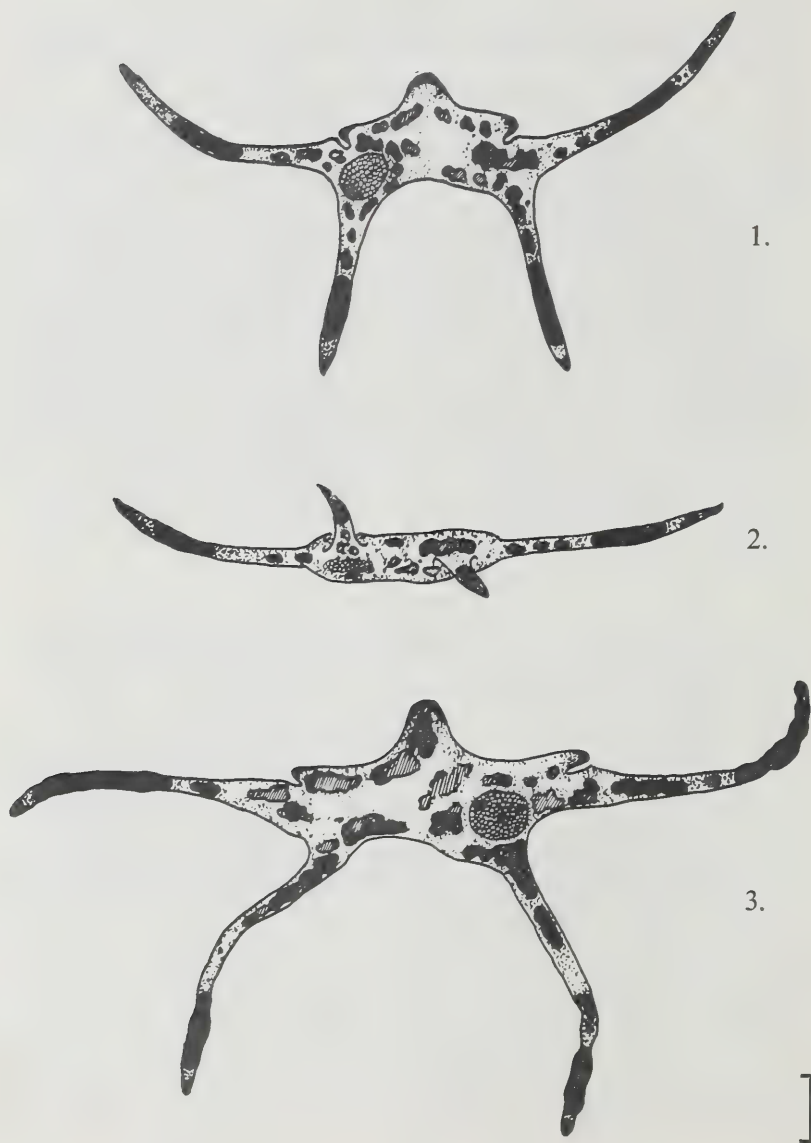
No stages of reproduction have as yet been observed. However, the other genera to which it appears to be related reproduce by the formation of zoospores or autospores.

A controversy exists over the significance of the non-motile stage in the classification of the group, as the zoospores of some of the species closely resemble members of the Gymnodiniales, notably those of some species of *Cystodinium* Klebs. Klebs (1912), Kofoid and Swezy (1921), and Lindemann (1928) have considered the mother cells as cystic, and have thus included the group among the Gymnodiniales due to the affinities of the motile stages. However, Fritsch (1935), Pascher (1927), Graham (1951), and Smith (1955) have considered the motile stages as zoospores (homologous with those of the Chlorococcales), and the present author has followed the latter system.

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## PLATE VII.

(Scale represents  $10\mu$ )

- Fig. 1. Typical appearance of specimen from the South West Indian Ocean (Iconotype).  
Fig. 2. Ventral view of same.  
Fig. 3. Larger specimen from warmer water.